



Part of **axing** group

**MK 800 | MK 1600**

**MK 806 | MK 1606**

**Multituner | DVB-C/DVB-T compact headend**

**Operation instructions**



---

# Table of contents

1.	Product description.....	4
1.1.	General.....	4
1.2.	Scope of delivery.....	4
1.3.	Inputs/multituner.....	5
1.4.	Output/modulators.....	6
1.5.	Graphical user interface.....	6
1.6.	SMARTPortal.....	6
1.7.	Display elements and connectors.....	7
1.7.1.	MK 800/160x.....	7
1.7.2.	MK 806/1606.....	7
2.	Mounting and Installation.....	8
2.1.	Wall mounting.....	8
2.2.	Mounting in a 19“ rack.....	8
2.3.	Equipotential bonding.....	9
2.4.	Power supply.....	9
2.5.	RF Installation.....	10
2.5.1.	Connection to DVB-T/T2 or DVB-C.....	10
2.5.2.	Connection to DVB-S/S2/S2x.....	10
2.5.3.	Output.....	10
2.5.4.	Connection to the Internet.....	11
3.	Configuration.....	12
3.1.	Login and logout.....	12
3.2.	Front page.....	14
3.2.1.	Input.....	14
3.2.2.	Outputs.....	14
3.3.	Initialization phase 1.....	15
3.3.1.	DVB-S/S2/S2x.....	15
3.3.2.	DVB-C, DVB-T or DVB-T2.....	16
3.3.3.	Bit error rate.....	17
3.3.4.	Found programmes.....	17
3.4.	Initialization phase 2.....	17
3.4.1.	Remux mode.....	18
3.4.2.	Cross Multiplex Mode.....	19
3.4.3.	LCN (Logical Channel Numbering).....	21
3.5.	Initialization phase 3 – DVB-C.....	22
3.5.1.	Configuration of the modulator.....	22
3.5.2.	Fill level.....	23
3.5.3.	Selected Programmes.....	23
3.6.	Initialization phase 3 – DVB-T.....	24
3.6.1.	Configuration of the modulator.....	24
3.6.2.	Fill level.....	26
3.6.3.	Selected Programmes.....	27
3.7.	Maintenance.....	28
3.7.1.	Updating firmware/software.....	28
3.7.2.	Modulation standard.....	29
3.7.3.	Changing the IP address.....	29
3.7.4.	Changing the password.....	31
3.7.5.	Rebooting.....	31
3.7.6.	Erasing service data.....	31
3.7.7.	Save Initialization Data.....	32
3.7.8.	Upload Initialization Data.....	32
3.7.9.	Device name.....	33
3.7.10.	Access to SMARTPortal.....	33
3.7.11.	Log files.....	34

3.7.12.	Channel list for all devices.....	34
4.	Use of CA modules.....	35
4.1.	Insertion of CA modules.....	35
4.2.	CI menu for MK 806/1606.....	35
4.2.1.	Using CI menu.....	35
4.3.	Decryption of programmes.....	36
5.	Technical specifications.....	37

## WARNING

**Safety instructions:**

- The installation of the device and repair work on the device must be carried out only by a professional in accordance with the applicable VDE directives. In case of incorrect installation, no liability is assumed.
- Never open the device. There are no parts to be maintained by the user inside the device, however, lethal voltages are present. This also applies to cleaning the device or working on the connections.
- Use only the mains cable enclosed to the device. Never replace any parts or make any modifications to the mains cable. Otherwise, there is a risk of death.
- If you intend not to use the device for a longer period of time, we recommend you to completely disconnect the device from the mains for safety reasons and for saving energy by pulling out the mains plug.
- Let the device adjust to the room temperature before commissioning, in particular if condensation is present on the device, or if it was exposed to large temperature fluctuations.
- The device must be operated only in moderate climate.
- The device must be operated only in dry rooms. In damp rooms or outdoors, there is a risk of short-circuits (attention: risk of fire) or electrical shocks (attention: risk of death).
- The device shall not be exposed to dripping or splashing. Do not place objects filled with liquids such as vases on the device.
- Plan the mounting or installation location such that you can easily reach the mains plug and interrupt the electric circuit in dangerous situations. Select the mounting or installation location such that children cannot play near the device and its connections without supervision. The mounting or installation location must allow a safe installation of all connected cables. Power supply cables and supply cables must not be damaged or squeezed by any objects.
- Operate the device only on a flat, firm surface and protect it against unintentional movements.
- Never expose the device to direct solar irradiation and avoid direct vicinity of heat sources (e.g. heaters, other electrical appliances, fireplace, etc.). It must be always ensured that devices with cooling elements or ventilation slots are not covered or obstructed.
- Ensure generous air circulation around the device. This will prevent possible damage to device and risk of fire due to overheating. It must be always ensured that cables are not located near heat sources (e.g. heaters, other electrical appliances, fireplace, etc.). The unit must be wall mounted with at least 5 cm clearance along the 4 sides. For 19-inch rack mounting, there must be at least 5 cm clearance in front of and behind the unit.
- In particular, the warranty and liability shall be excluded for the consequences of incorrect use, in case of incorrect modifications or repair work carried out by the customer. Use the device only as described in the operating instructions and in particular according to the state-of-the-art.
- The antenna system must be installed and grounded according to the current DIN EN 60728-11 standard.



Herewith AXING AG declares that the marked products comply with the valid guidelines. You can call up the complete EU declaration of conformity for download by entering the article in the search field at [www.axing.com](http://www.axing.com).



WEEE Nr. DE26869279 | Electrical and electronic components must not be disposed of as residual waste, it must be disposed of separately.

---

# 1. Product description

## 1.1. General

MK 800	Eight independent multituner inputs Transmodulates 8 × DVB-S/S2/S2x/T/T2/C into 8 × DVB-C or DVB-T (depending on the configured modulation standard, see 3.7.2 on page 28)
MK 1600	16 independent multituner inputs Transmodulates 16 × DVB-S/S2/S2x/T/T2/C into 16 × DVB-C or DVB- T (depending on the configured modulation standard, see 3.7.2 on page 28)

### Common Features:

- Remux | Crossmultiplex
- Web-based configuration | Remote maintenance
- Suitable for AXING SMARTPortal
- Can be used for wall mounting or as a 19" unit
- Built-in power supply

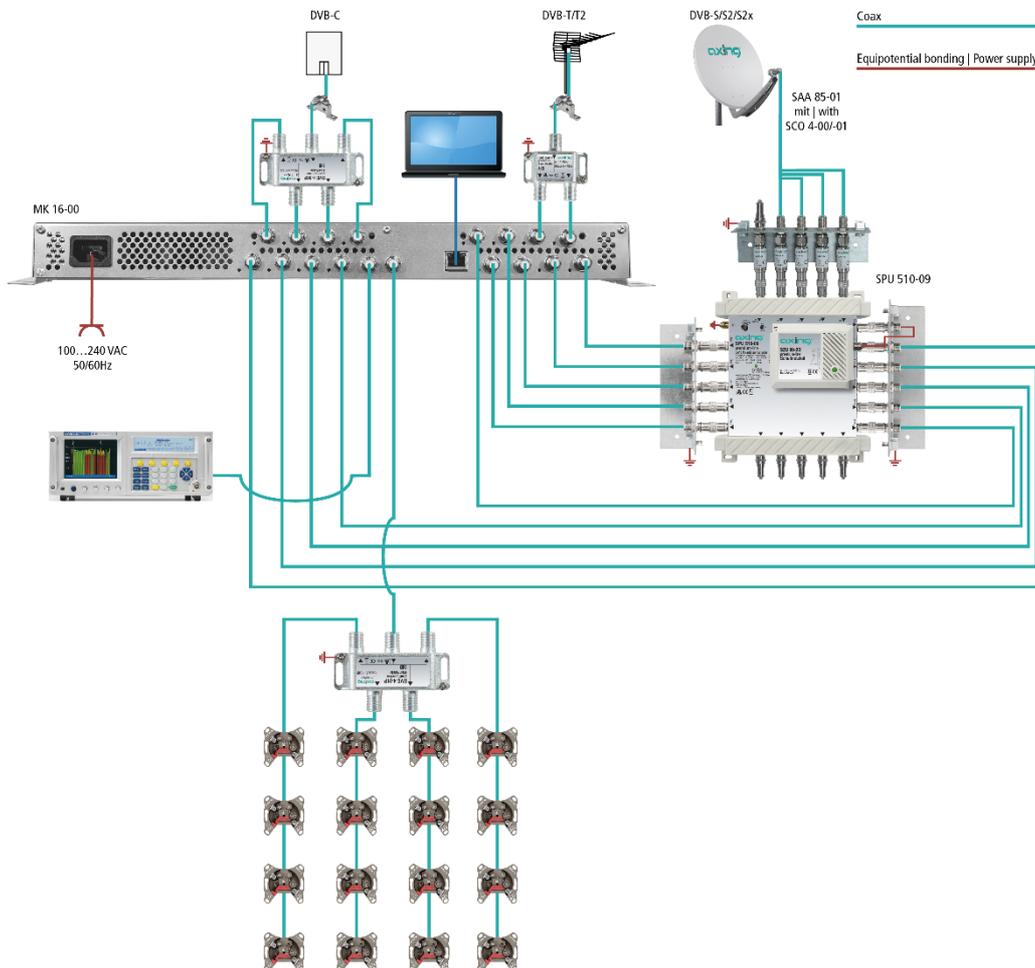
## 1.2. Scope of delivery

- 1 × Compact headend
- 1 × AC power cord
- 1 × Quick start guide

---

### 1.3. Inputs/multituner

Headend devices with multituner can receive DVB-S/S2/S2x, DVB-T/T2 or DVB-C. **For receiving DVB-T/T2 or DVB-C the LNB power has to be switched off before connecting a antenna cable to one of the HF inputs** (see 3.3.2 on page 16)!



#### Direct connection to the LNBs

The devices have a remote supply voltage for the LNB and DiSEqC 1.0 functionalities at the inputs. The inputs can be connected directly to the LNB.

#### Multiswitches as input distributors (recommended)

Optionally, you can also use multiswitches as input distributors. The advantage of this solution is that you can set both the polarization and the satellite via the user interface. Changes in the list of programmes can be made using remote maintenance, so that it is not necessary to change or modify the input distribution on site.

#### Demodulation of the data stream

The selection of the frequency and the demodulation of the data stream are both done in the tuner.

If needed, the programmes from the data flow of the demodulated transponder can be filtered (Remux mode).

Thanks to the Cross Multiplex Mode, FTA programmes (Free to Air) can be filtered from the data flow of several tuners for a common output channel and be bundled again.

The prepared data flow is passed on to the modulators.

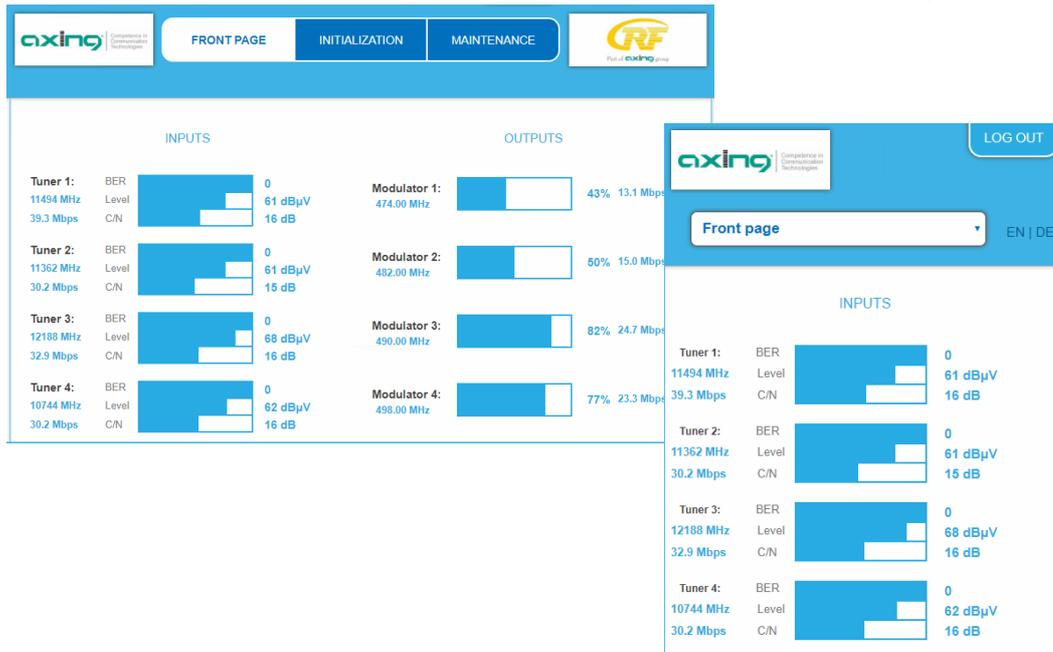
## 1.4. Output/modulators

The **MK 80x** have eight output modulators. The **MK 160x** have 16 output modulators. All modulators can be set to any output channel (DVB-C = S2...K87 | DVB-T = S2...K69).

## 1.5. Graphical user interface

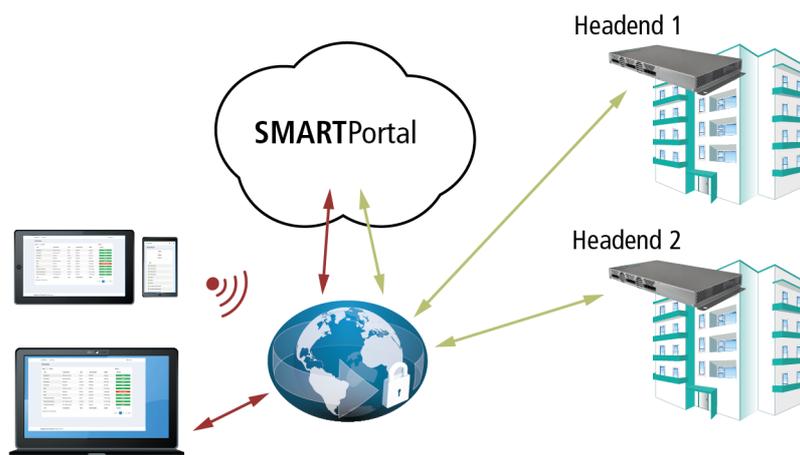
The settings can be changed via the user interface of the integrated web interface. To access the user interface and thus configure the devices, you need a standard PC/laptop with a network interface and the actual version of the installed web browser (left).

The configuration interface is "mobile ready" and can therefore also be used from the smartphone or tablet



(right).

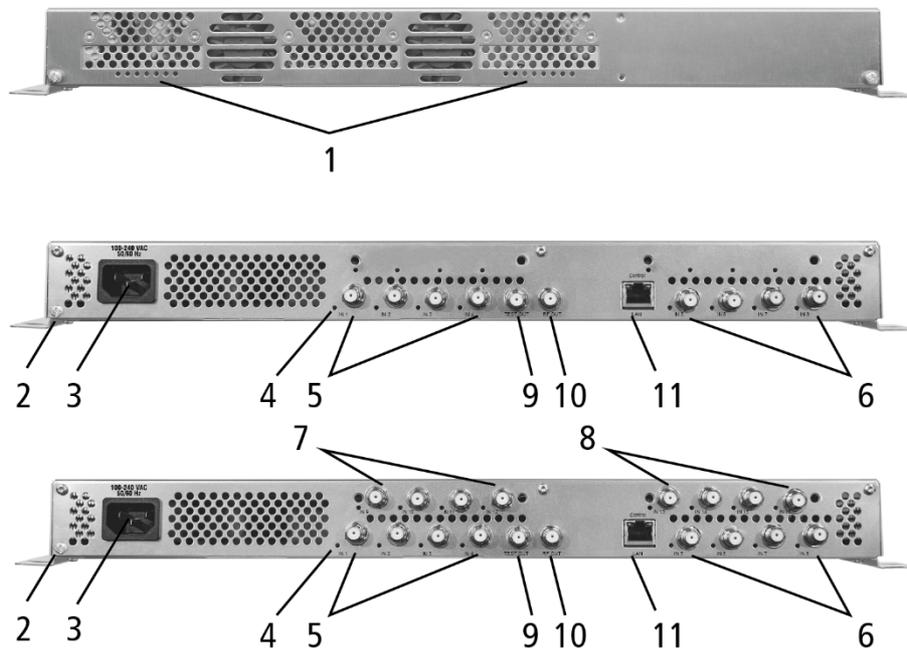
## 1.6. SMARTPortal



---

## 1.7. Display elements and connectors

### 1.7.1. MK 8/160x

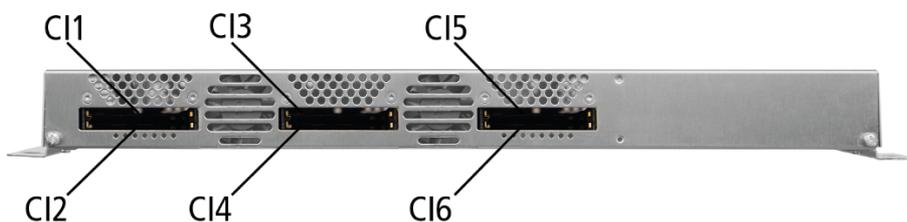


1. LED indicators
  - Green = modulation is ok
  - Green (blinking) = something is missing from the programmed TS
  - Red = modulator overload.
2. Equipotential bonding connection
3. Mains connection
4. HF input LEDs:
  - Yellow = MPEG data stream present,
  - Off = MPEG data stream not present
5. RF input 1...4
6. RF input 5...8
7. RF input 9...12 (MK 16-0x only)
8. RF input 13...16 (MK 16-0x only)
9. Test port
10. RF output
11. RJ45 Ethernet connector

### 1.7.2. MK 806/1606

MK 806 and MK 1606 each have 6 common interfaces (CI1 ... CI6).

Which encrypted program you decrypt with which interface, you determine in the configuration.



---

## 2. Mounting and Installation

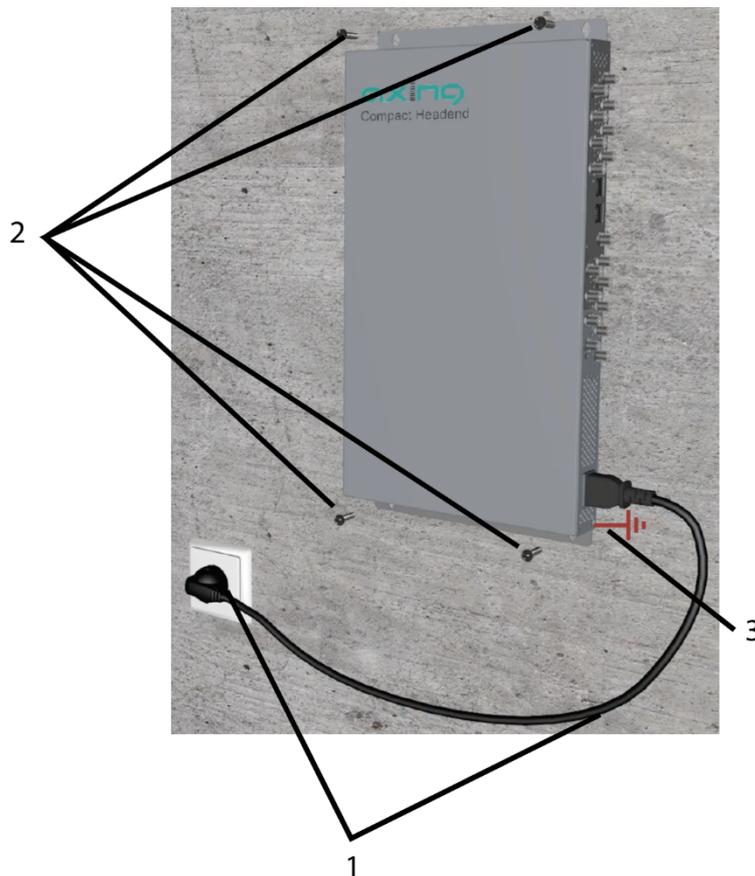
- Installation must be performed by authorized and skilled electricians only.
- Before mounting and installation, pull the mains plug (1)!
- The antenna system must be installed and grounded according to the EN 60728-11 standard.

The compact headend can be mounted on either at the wall or be mounted in a 19" rack.

### 2.1. Wall mounting

The compact headend are factory-fitted with wall brackets.

**Note:** The unit must be wall mounted with at least 5 cm clearance along the 4 sides.

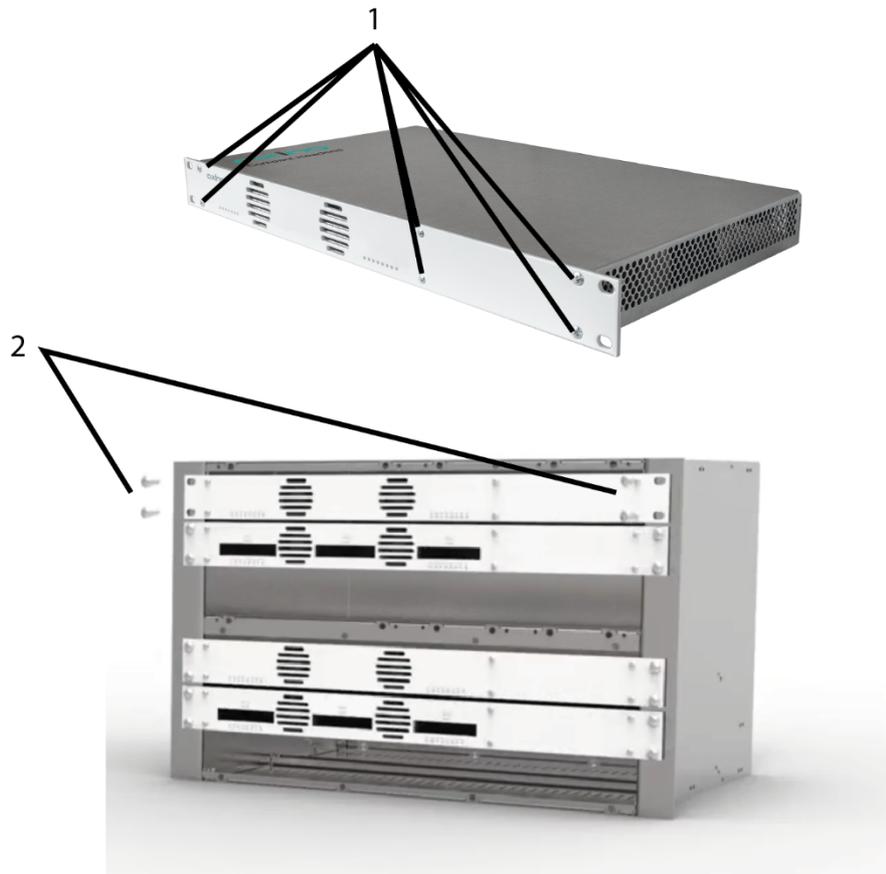


- The installation must be carried out on an even and vertical surface (any unevenness must be compensated).
- Fix the headend with with minimum four pcs of  $4 \times 30$  mm screws.
- The headend must be connected to the equipotential bonding according to EN 60728-11 (3)

### 2.2. Mounting in a 19" rack

**Note:** For 19-inch rack mounting, there must be at least 5 cm clearance in front of and behind the unit.

- Remove the wall bracket from the housing of the compact headend.
- Mount the front plate MKZ 1-00 onto the MK 800 / 1600 (1).



- ➔ Slide the compact headend into the 19 "rack.
- ➔ Screw the compact headend with four screws (2).
- ➔ Maintain the EN 60728-11.

### 2.3. Equipotential bonding

- ➔ To connect the outer conductor of the coaxial cable to the equipotential bonding, use e.g. QEW earthing angles or CFA earth connection blocks at the inputs and output (see 2.5 on page 10).

### 2.4. Power supply

The 19 "units have a built-in power supply. For example, connect the units to an electrical outlet (100 ... 240 VAC / 50 ... 60 Hz).

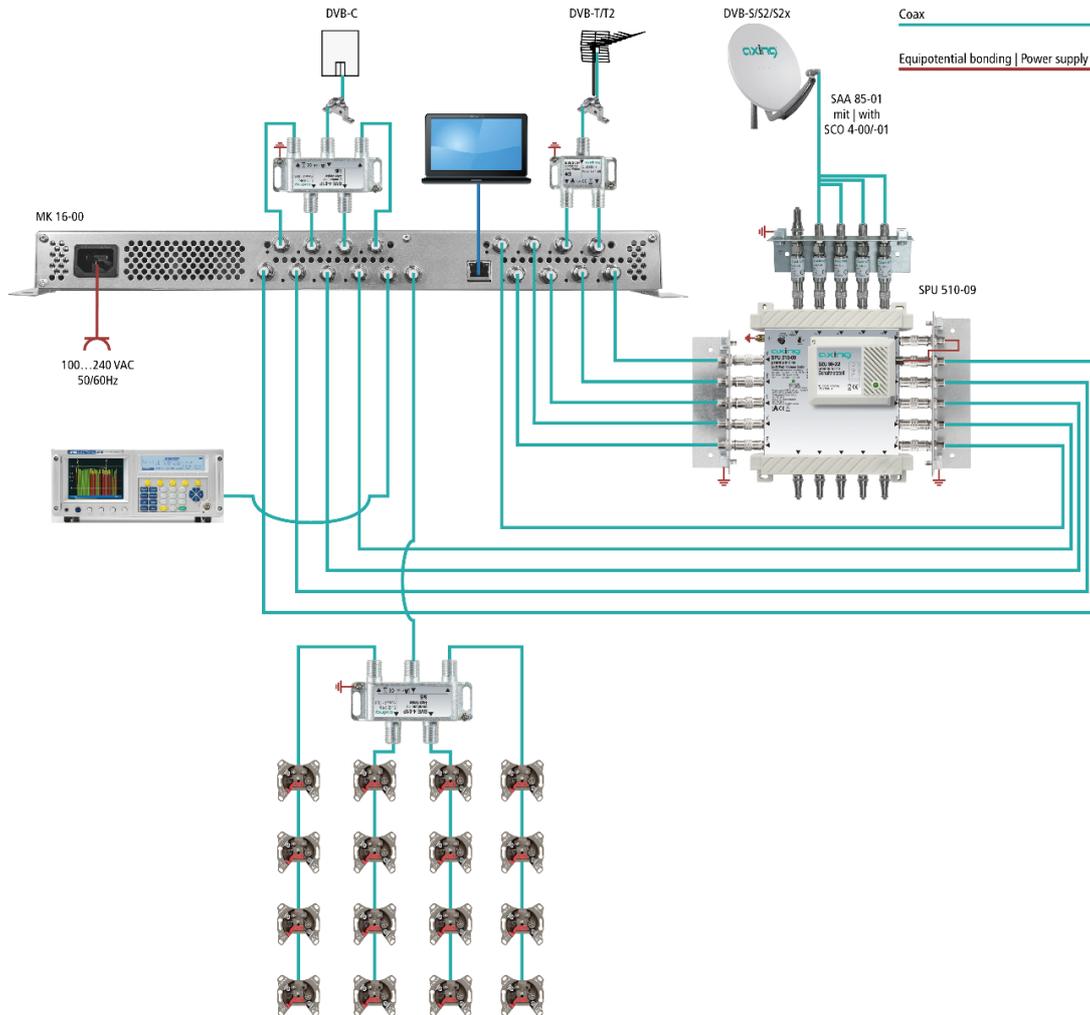
---

## 2.5. RF Installation

### 2.5.1. Connection to DVB-T/T2 or DVB-C

#### CAUTION

Before connecting the antenna cable, the LNB power has to be switched off (see 3.3.2 on page 16). Active DVB-T antennas have to be supplied by an external power supply.



### 2.5.2. Connection to DVB-S/S2/S2x

#### Connection to the LNBs

On the SAT-IF input the compact headends have a remote supply voltage for the LNB and use DiSEqC 1.0 functionalities. Therefore, they can be connected directly to the LNB.

#### Multiswitches as input distributors

Optionally, you can also use multiswitches as input distributors. The advantage of this solution is that you can set both the SAT IF level and the satellite via the user interface. Changes in the list of programmes can be made using remote maintenance, so that it is not necessary to change or modify the input distribution on site.

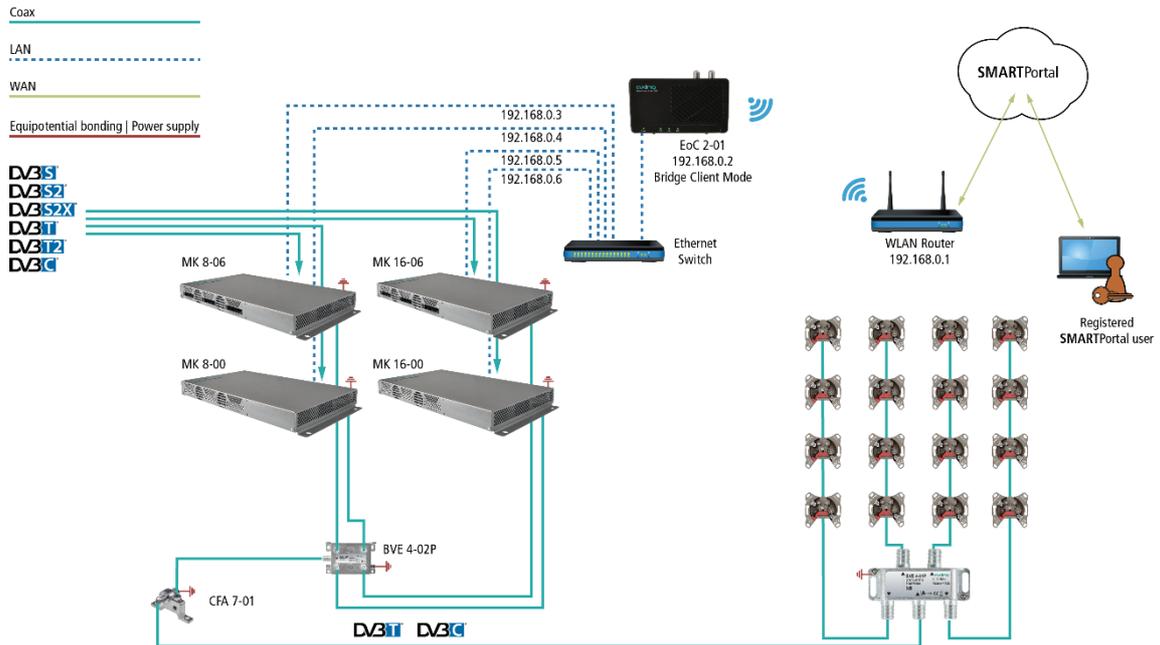
### 2.5.3. Output

If you use more than one compact headend, you have to use a combiner to combine the output signals.

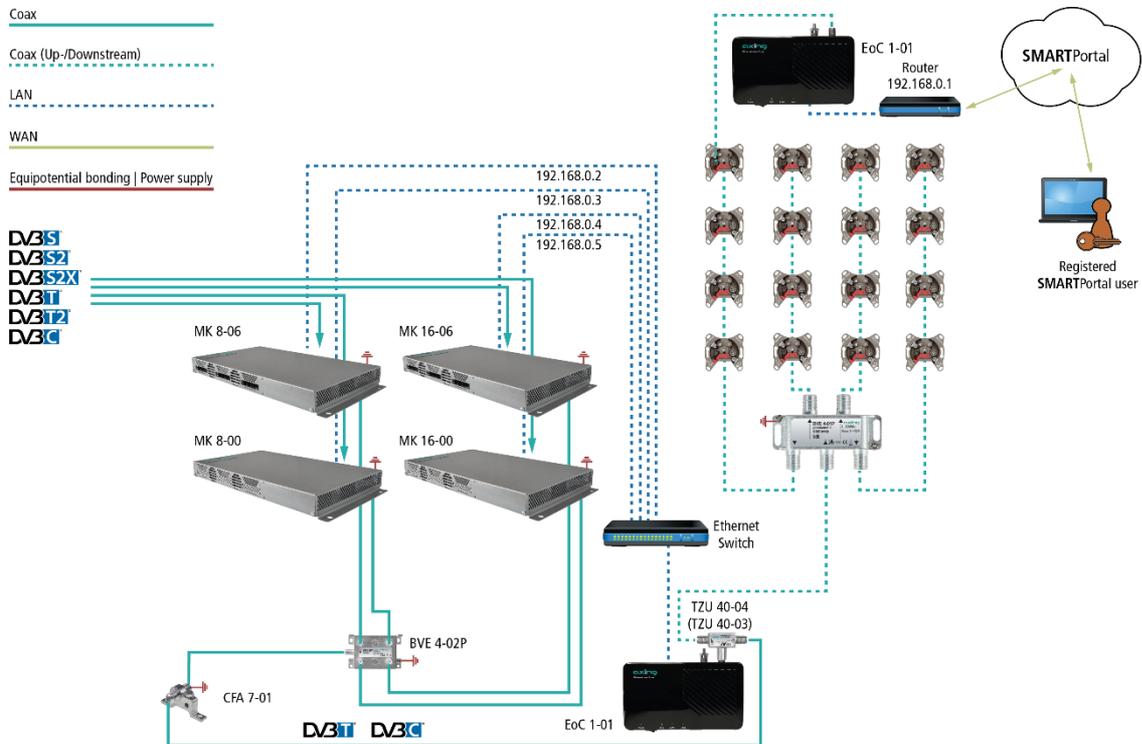
Note: There has to be used galvanic isolator between the output connector and antenna network in Sweden and Norway state area.

## 2.5.4. Connection to the Internet

Connection via Ethernet over Coax to a router which is connected to the Internet.



Connection via EoC 2-01 in „Bridge Client Mode“ to a WLAN router.



---

## 3. Configuration

The device is configured via the graphical user interface of the integrated web interface.

To access the user interface, you need a standard PC/laptop with a network interface and the actual version of the installed web browser. To connect the network interface of the headend to the computer, you need a commercially available network cable.

The HTTP protocol is used for communication allowing a worldwide remote maintenance of the systems at various locations via the Internet. Access protection is implemented by means of the password prompt.

IP address:	192.168.0.145
Subnet mask:	255.255.255.0

The computer and the headend must be in the same subnetwork. The network part of the IP address of the computer must be set to 192.168.0. and the subnet mask must be set to 255.255.255.0.

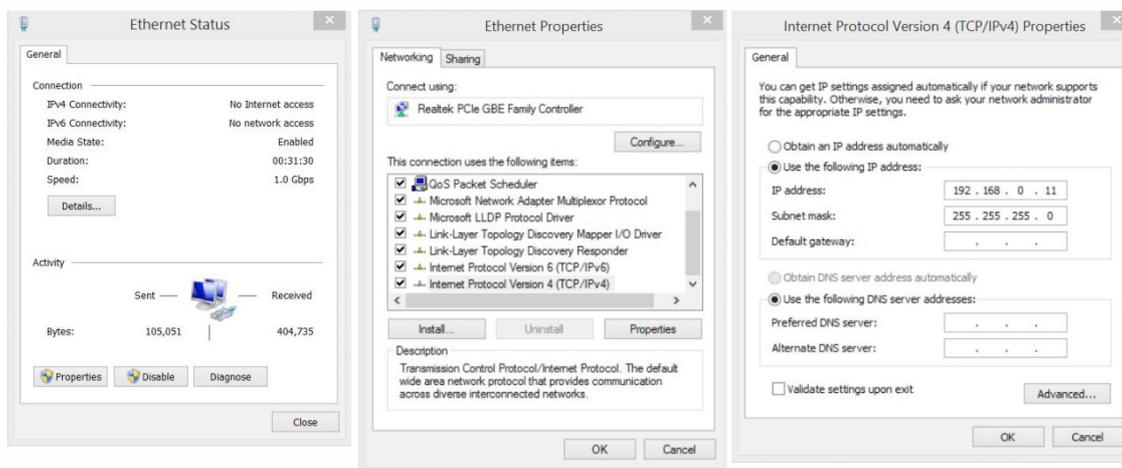
The host part of the network address is required for the identification of the devices and can be assigned in the subnetwork only once. You can allocate to the computer any not allocated host address between 0 and 255.

### Hint:

Change the IP address and the subnet mask of your computer accordingly.

(e.g.: IP address:192.168.0.11 and subnet mask: 255.255.255.0)

*Control panel > Network connections > LAN connection > Properties > Internet protocol version 4 TCP/IPv4 > Properties > Use the following IP address:*



➔ Click OK to save.

➔ Start your web browser and enter the IP address of the headend: e.g.: 192.168.0.145.

### 3.1. Login and logout

The web-based user interface is protected against unauthorized access. When accessing the user interface, the first thing is the password request.

- ➔ Enter the default password: *Ramsen8262*
- ➔ Click ENTER PASSWORD.
- ➔ If you are not automatically forwarded to the start page, click OPEN PAGE.

The standard language of the user interface is English. In the header, the the language of the user interface can be changed. The possibilities are German (DE) and English (EN). The chosen language applies until the end of the session.



➔ To log out, click LOG OUT.

**Notes:**

- If the browser is closed while you are still logged in, an automatic logout occurs 2.5 minutes later.
- If the browser window stays open, there is no automatic logout. It allows monitoring the installation via the web browser.

**Changing the password:**

- ➔ Please change the password immediately after the first commissioning and choose a sufficiently safe password. Keep this password at a safe place.
- ➔ Menu item: MAINTENANCE > SET NEW PASSWORD (see 3.7.4 on page 30).

**Changing the IP address:**

If needed, the headends can be integrated in a network. For this application, some changes must be applied to the network configuration.

- ➔ Menu item MAINTENANCE > SYSTEM.

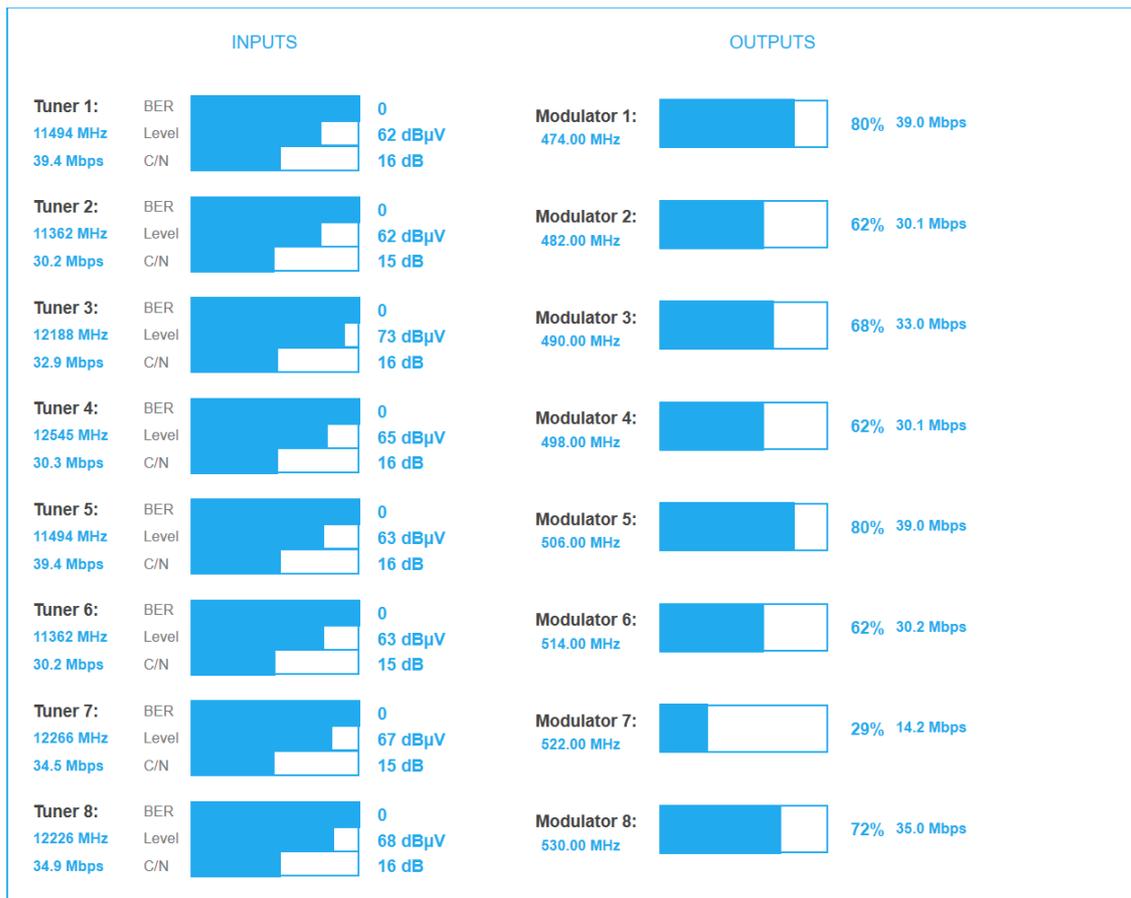
## 3.2. Front page

The relevant information required for the function of the system are shown on the front page. The decisive thing is the quality of the signals at the INPUT and the utilization of the modulators at the OUTPUT.

### 3.2.1. Input

The bit error rate BER of all four tuners is shown on the left side. The amount of bit errors for the last 1,000,000 transferred bits is calculated.

Also the LEVEL and the C/N ratio are shown.



### 3.2.2. Outputs

The fill level of all modulators is shown. 100% modulator fill level correspond to the maximal net data rate of the output channel.

If the current fill level exceeds the maximal fill level, it may cause image disturbances, e.g. mosaic images.

The data rates of the programmes are not constant. They are dynamically changed by the sender. To ensure an undisturbed reception, a reserve must absolutely be observed.

**We recommend you to set the maximal fill level to 90%.**

From a fill level of 95%, this is indicated in red.



---

The number of chosen programmes (see 3.4 on page 17) and the configuration of the modulators (see 3.5 on page 22) have an influence to the fill level.

### 3.3. Initialization phase 1

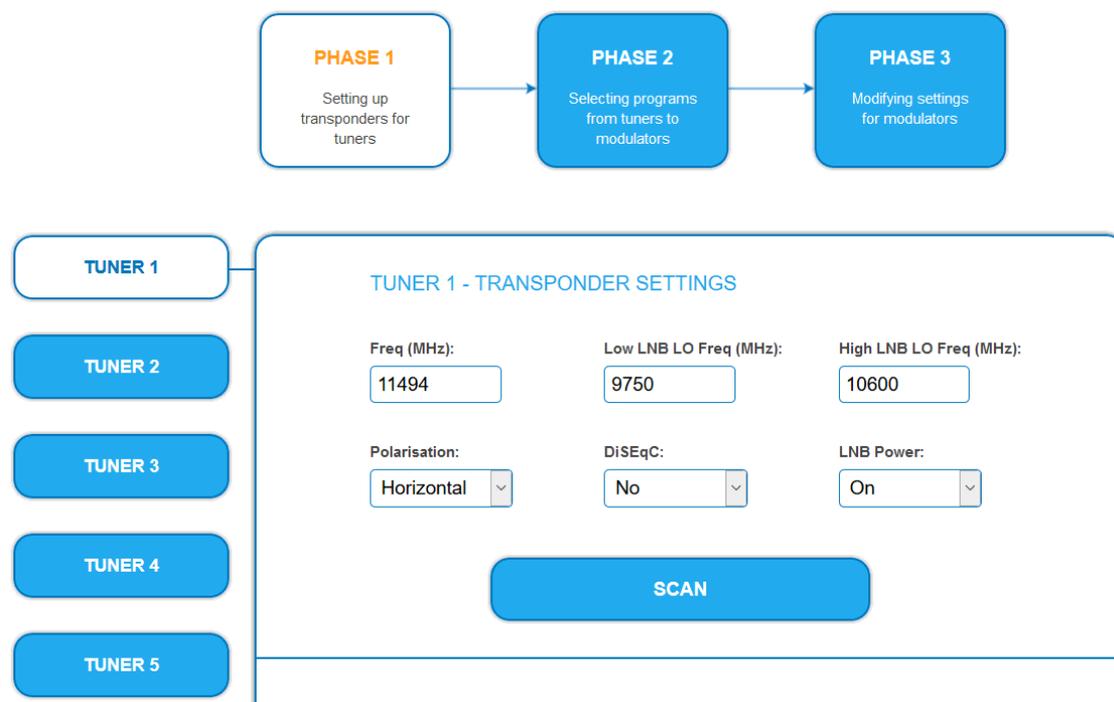
→ Choose INITIALIZATION from the main menu.

During the first phase of the initialization, the tuner settings required for the scan are made and the station scanning is carried out. The four tuners work independently from each other and after the same principle.

#### 3.3.1. DVB-S/S2/S2x

→ Click TUNER 1...8 to select one tuner.

→ Configure the needed settings for all tuners.



The SAT IF frequency of the transponder is entered in the input field **Freq (MHz)**.

The input fields **Low LNB LO Freq (MHz)** and **High LNB LO Freq (MHz)** correspond to the oscillator frequencies of the LNB in low and high band. The default settings of the oscillator frequencies are 9,750 MHz for the low band and 10,600 MHz for the high band.

In the optional field **Polarisation**, you can switch from horizontal to vertical.

In the optional field **DiSEqC**, the DiSEqC command signals can be turned off or set to switch a DiSEqC-enabled multi switch on the positions 1 to 4.

If required, the operating voltage for the LNB can be switched off via the optional field **LNB Power**.

→ After all settings have been made, click SCAN.

A rotating circle is shown during the scanning process.

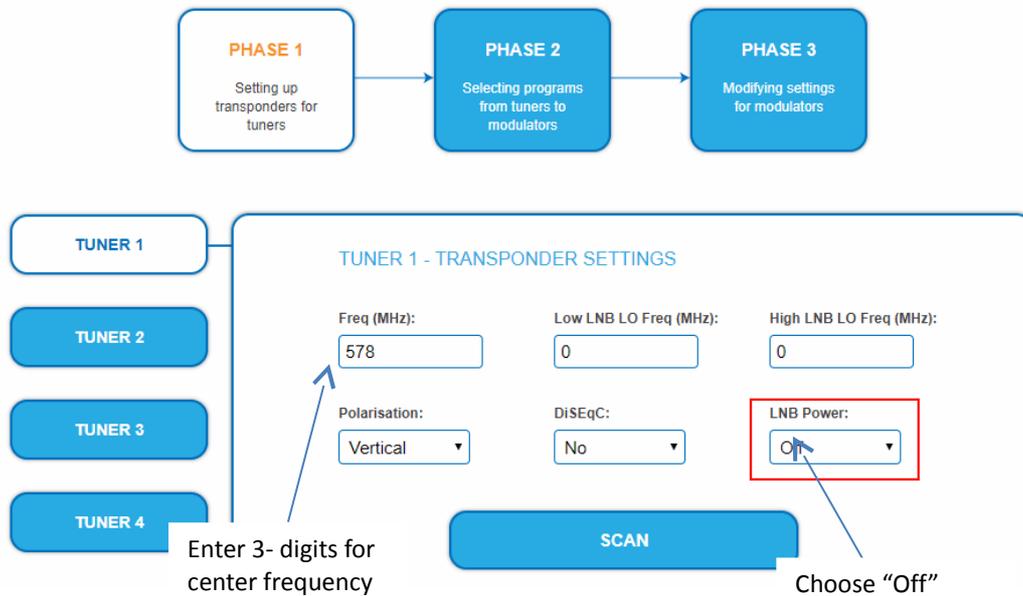
### 3.3.2. DVB-C, DVB-T or DVB-T2

## ⚠ CAUTION

Before connecting an antenna cable to a tuner, the **LNB Power** has to be set to **Off**

→ Click TUNER 1...4 to select one tuner.

→ In the field **LNB power** choose the option **Off**.



→ Enter the center frequency (see table below) for the receiving channel into the field **FREQ (MHz)**.

Channel	Input	Channel	Input	Channel	Input	Channel	Input
S 21	306	21	474	41	634	61	794
S 22	314	22	482	42	642	62	802
S 23	322	23	490	43	650	63	810
S 24	330	24	498	44	658	64	818
S 25	338	25	506	45	666	65	826
S 26	346	26	514	46	674	66	834
S 27	354	27	522	47	682	67	842
S 28	362	28	530	48	690	68	850
S 29	370	29	538	49	698	69	858
S 30	378	30	546	50	706		
S 31	386	31	554	51	714		
S 32	394	32	562	52	722		
S 33	402	33	570	53	730		
S 34	410	34	578	54	738		
S 35	418	35	586	55	746		
S 36	426	36	594	56	754		
S 37	434	37	602	57	762		
S 38	442	38	610	58	770		
S 39	450	39	618	59	778		
S 40	458	40	626	60	786		
S 41	466						

**Note:** The center frequency of channels using a bandwidth of 7MHz will be rounded down to 3 full digits. For example: center frequency of CH 5 = 177,5 MHz, the according input = 177.

**Note:** All other entry fields are not relevant. Modulation and all other important parameter for reception are detected automatically.

### 3.3.3. Bit error rate

The **BIT ERROR RATE** is shown. The amount of bit errors for the last 1,000,000 transferred bits is calculated.

---

#### BIT ERROR RATE

Tuner 1:

### 3.3.4. Found programmes

After a successful station scanning, the radio and TV stations are shown in the area FOUND PROGRAMS. The table contains information about the Program Name, the Type and the Encryption.

#### FOUND PROGRAMS

Program Name	Type	Encryption
Das Erste HD	TV	FTA
arte HD	TV	FTA
SWR BW HD	TV	FTA
SWR RP HD	TV	FTA

### 3.4. Initialization phase 2

In the initialization PHASE 2, the found programmes are subdivided by tuner.

➔ Click on PHASE 2, to select programs.



After the station scanning in initialization phase 1 no programmes are activated.

All lines of the programme table have in the "Modulator" column four colored buttons M1 to M4. The buttons correspond to the four modulators. The allocation of the buttons is given in the COLOR CODES legend.

You can assign programmes to modulators in REMUX MODE or in CROSS MULTIPLEX MODE.

## **IMPORTANT**

➔ With each programme you assign to an modulator, the data rate rises.

➔ The performed modifications are only taken over by the system when you click on SAVE CHANGES.

### 3.4.1. Remux mode

If the the **Network ID** are set on **auto**, the device works in the Remux mode. In this mode, the IDs from the set transponder and from the satellite are used and forwarded to the modulators with virtually no changes. The **TS ID1** to **TS ID8** of the four modulators, are also set on **auto**.

**Note:**

- ➔ If the device is already set to CROSS MULTIPLEX MODE, set the **Network ID** to **auto**.
- ➔ Click on SAVE CHANGES.
- The device ist set back to REMUX MODE.

### Assigning programmes

Every tuner is assigned to a modulator. The programmes of the tuner can only be assigned to the associated modulator.

- ➔ For example click in table TUNER 1 on M1.
- The program is assigned to modulator 1. The button of the modulator is highlighted in color (a new click on a modulator allow the assignment to be canceled. The modulator fades then again).

Chosen programs for modulator 1

TUNER 1														
Modulator		LCN	Program Name	Type	Encryption	Decrypt	Service ID	Audio Lan						
M1	M2	M3	M4	M5	M6	M7	M8		Das Erste HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL
M1	M2	M3	M4	M5	M6	M7	M8		arte HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL
M1	M2	M3	M4	M5	M6	M7	M8		SWR BW HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL
M1	M2	M3	M4	M5	M6	M7	M8		SWR RP HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL

- ➔ Choose the programmes for TUNER 1 to TUNER 8.
- ➔ Click on SAVE CHANGES.
- The assignment is saved tot he device.

### Service ID

In remux mode the column **Service ID** is grayed and disabled until user enters network ID (change into cross multiplex mode).

### 3.4.2. Cross Multiplex Mode

The cross multiplex mode is used:

- To split the programmes of a transponder to several modulators.
- To merge pograms of several transponders into one output channel.

Transmission capacities in the distribution networks can be optimized.

→ Change the **Network ID** to a value greater than zero.

**COLOR CODES**

- M1 = Modulator 1
- M2 = Modulator 2
- M3 = Modulator 3
- M4 = Modulator 4
- M5 = Modulator 5
- M6 = Modulator 6
- M7 = Modulator 7
- M8 = Modulator 8

**TRANSPORT STREAMS AND NETWORK**

TS ID1: M1

TS ID2: M2

TS ID3: M3

TS ID4: M4

TS ID5: M5

TS ID6: M6

TS ID7: M7

TS ID8: M8

Network ID:

Region:

CROSS MULTIPLEX MODE

SAVE CHANGES

CANCEL CHANGES

→ Click on **SAVE CHANGES**.

The IDs of the transport streams **TS ID1** to **TS ID8** are automatically incremented by one to four, the cross multiplex mode is activated.

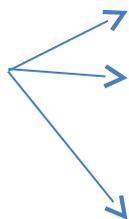
**Important:**

- The **CROSS MULTIPLEX MODE** can not be used for CA programmes, which are encrypted in the haedend!
- A splitted transponder works like two transponders.
- If you use the cross multiplex mode in several headends, the **Network IDs** of the headends have to be different.

**Assigning programmes to the modulators**

In the cross multiplex mode, the tuners are no longer assigned to one modulator.

Programs, which are assigned to modulator 1



TUNER 1								
Modulator	LCN	Programmname	Typ	Verschlüsselung	Entschlüsselung	SID	Audiosprache	
M1	1	Das Erste HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL	
M2		arte HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL	
M3	3	SWR BW HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL	
M4		SWR RP HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL	

TUNER 2								
Modulator	LCN	Programmname	Typ	Verschlüsselung	Entschlüsselung	SID	Audiosprache	
M1	2	ZDF HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL	
M2		zdf_neo HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL	

→ Click the table **TUNER 1** to **TUNER 4** on **M1**.

The programs are assigned to modulator 1.

## Splitting the programmes of a transponder

If there are too many programmes transmitted in one transponder, they can be split to several modulators.

The programmes of one transponder are split to two modulators

TUNER 1															
Modulator		LCN	Program Name	Type	Encryption	Decrypt	Service ID	Audio Lan							
M1	M2	M3	M4	M5	M6	M7	M8		Das Erste HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL	▼
M1	M2	M3	M4	M5	M6	M7	M8		arte HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL	▼
M1	M2	M3	M4	M5	M6	M7	M8		SWR BW HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL	▼
M1	M2	M3	M4	M5	M6	M7	M8		SWR RP HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL	▼

→ For example: choose modulator M1 for two programmes and modulator M2 for two other programmes.

### Service ID

Changes of the **Service ID** are only necessary for STBs using fix preset IDs. These STBs are used of some providers to suppress reception for external devices.

TUNER 1															
Modulator		LCN	Program Name	Type	Encryption	Decrypt	Service ID	Audio Lan							
M1	M2	M3	M4	M5	M6	M7	M8		Das Erste HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No	101	ALL	▼
M1	M2	M3	M4	M5	M6	M7	M8		arte HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No	112	ALL	▼
M1	M2	M3	M4	M5	M6	M7	M8		SWR BW HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No	113	ALL	▼
M1	M2	M3	M4	M5	M6	M7	M8		SWR RP HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No	120	ALL	▼



## CAUTION

Modifications of the Service ID should only be done after consulting the provider. **Not provided modifications will cause problems.**

### 3.4.3. LCN (Logical Channel Numbering)

During the scan of TV stations, the stations are usually saved in the sequence of the channel lists in tuner 1-4. The LCN function enables channel allocation for the station scan of the TV devices. The TV device must support the LCN function.

LCN can be used in REMUX as well as in Cross-Multiplex-Mode.

**COLOR CODES**

M1 = Modulator 1

M2 = Modulator 2

M3 = Modulator 3

M4 = Modulator 4

M5 = Modulator 5

M6 = Modulator 6

M7 = Modulator 7

M8 = Modulator 8

**TRANSPORT STREAMS AND NETWORK**

TS ID1: M1

TS ID2: M2

TS ID3: M3

TS ID4: M4

TS ID5: M5

TS ID6: M6

TS ID7: M7

TS ID8: M8

Network ID:

Region: Central Europe (0x28) ▾

CROSS MULTIPLEX MODE

SAVE CHANGES

CANCEL CHANGES

The drop down menu **Region** is only relevant for LCN. This standard may vary from area to area. Different LCN standards can be selected.

➔ Insert the desired LCN into the input field.

Example: [Your favorite station] on channel 1, [Your second favorite station] on channel 2 and so on (to delete the allocation, the LCN number in the corresponding field must be deleted).

TUNER 1									
Modulator		LCN	Program Name	Type	Encryption	Decrypt	Service ID	Audio Lan	
M1	M2	1	Das Erste HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL ▾	
M3	M4		arte HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL ▾	
M5	M6	3	SWR BW HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL ▾	
M7	M8		SWR RP HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL ▾	

TUNER 2									
Modulator		LCN	Program Name	Type	Encryption	Decrypt	Service ID	Audio Lan	
M1	M2	2	ZDF HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL ▾	
M3	M4		zdf_neo HD	TV	FTA	<input type="radio"/> Yes <input checked="" type="radio"/> No		ALL ▾	

➔ Click SAVE CHANGES.

The numbers of the channels are saved.

### 3.5. Initialization phase 3 – DVB-C

**Note:** Depending on the modulation standard the signals are modulated into DVB-C or DVB-T (see 3.7.2 on page 28).

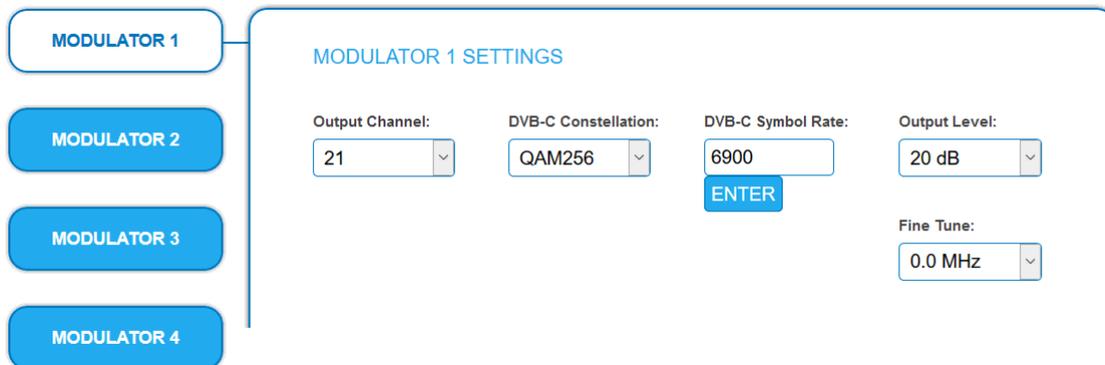
In phase 3, the modulators are configured.

➔ Click on PHASE 3, to modify the setting of the modulator.



The output channels are compulsory assigned to adjacent channels.

#### 3.5.1. Configuration of the modulator

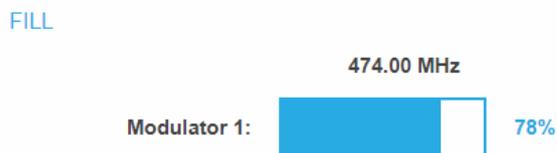


Output channels and channel spacing	The eight modulators can be set to any output channel between S2 and CH 87. No output channel can be assigned several times!
DVB-C modulation:	With DVB-C modulation, you can choose between 32QAM, 64QAM, 128QAM and 256QAM. 256QAM enables the highest data transmission rate, but it also requires the best network quality.
DVB-C symbol rate:	The DVB-C symbol rate can be freely set between 1000 and 7500. The standard value is 6900. Some networks also work with 6875. When working with a bandwidth of 7 MHz, 6111 is customary.
Output level / Level setting	The <i>Output Level</i> options include attenuation and deactivation of the modulator. Each of the four modulators is set separately. The max. output level of approx. 100 dBµV is reached with an <i>Output Level</i> setting of 20 dB.
Vernier adjustment:	The vernier adjustment of the output channel is performed in 0.5 MHz steps.

---

### 3.5.2. Fill level

The fill level depends on the number of activated channels in the channel list (menu item Phase 2) If the CROSS MULTIPLEX MODE is active, it must be ensured that the maximum number of activated channels in one modulator is not exceeded.



The data rate of the channels on the DVB-S/S2/S2x transponders may vary depending on the image contents and on the transmission quality. To ensure an undisturbed reception, a reserve must absolutely be observed. We recommend you to set the maximum fill level to 95%. If the current fill level exceeds the maximal fill level, it may cause image disturbances, such as mosaic images. The error LEDs on the front panel will light up in red in this case.

The data rate of a DVB-C channel depends on the selected channel bandwidth (7 or 8 MHz), the set symbol rate and the DVB-C modulation (QAM32;64;128;256) of the modulator.

If the displayed data rate exceeds 95%, there are different possibilities

to change it:

- ➔ Change to a channel with a bandwidth of 8 MHz if a 7 MHz channel was selected previously.
- ➔ Set DVB-C modulation to a larger value, for example, change from QAM 64 to QAM 128.
- ➔ Reduce the number of selected channels in the channel list.
- ➔ If the connected receivers support this option, increase the symbol rate.

### 3.5.3. Selected Programmes

The programme table SELECTED PROGRAMS shows the programmes that were activated in phase 2.

SELECTED PROGRAMS

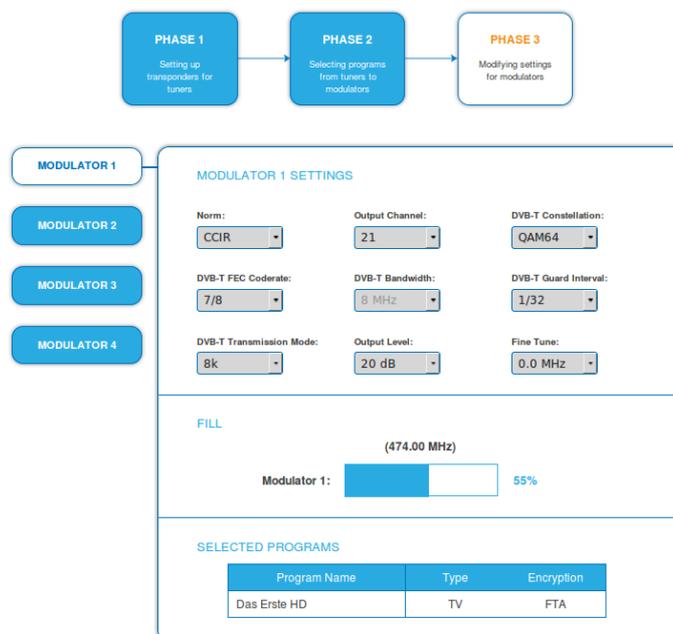
Program Name	Type	Encryption
Das Erste HD	TV	FTA
SWR BW HD	TV	FTA

## 3.6. Initialization phase 3 – DVB-T

**Note:** Depending on the modulation standard the signals are modulated into DVB-C or DVB-T (see 3.7.2 on page 28).

In phase 3, the modulators are configured.

After assigning programmes to the modulator the fill level has to be controlled. With the parameters of the modulator, the datarate can in certain circumstances be reduced.



### 3.6.1. Configuration of the modulator

**Norm:** In this selection field, you can set the norm for the output channel spacing in the output channel window.

**Output channel:** The modulators can be set to any output channel between S2 and CH 69.

**DVB-T modulation:** The modulation can be set on QPSK, on QAM 16 or on QAM 64. The QPSK-setting provides the smallest data rate to the output channel. The QPSK-modulation process is used in bad distribution networks because of its robustness against disturbances and of its safe transmission. The QAM-modulation process allow reaching higher data rates, so that more programmes can be transmitted on a channel. The QAM 64-modulation gives the highest data rate.

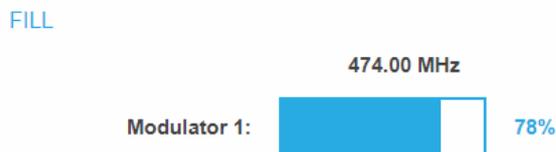
- QPSK (2 bit) – small data rate – very robust signal.
- QAM 16 (4 bit) - middle data rate.
- QAM 64 (6 bit) - high data rate.

---

DVB-T FEC (forward error correction):	<p>Thanks to the error correction, errors resulting from high-disturbed transmission routes can be balanced by restoring data.</p> <p>The data required to restore the signal are included in the transmitted FEC bits.</p> <p>Changing the FEC factor modifies the part of the FEC data in relation to the application data.</p> <p>A higher part of FEC data means an higher transmission redundancy. But this reduces the bandwidth for the useful data too.</p> <p>A FEC of 7/8 means the highest rate for the useful data and the smallest transmission redundancy.</p> <ul style="list-style-type: none"> <li>• FEC 1/2 - small data rate - strong protection against errors.</li> <li>• FEC 7/8 - high data rate - weak protection against errors.</li> </ul>
DVB-T bandwidth:	<p>The DVB-T standard plans a broadcast on 6, 7 or 8 MHz channels. A bigger bandwidth means that more data can be transmitted on a single channel.</p> <p>In the CCIR channel spacing, the lower channels: C5...S20 have a provided bandwidth of 7 MHz. The other channels have a bandwidth of 8 MHz.</p> <p>If the bandwidth is changed, the channel does not correspond any longer to the set channel spacing. Therefore, the output frequency for all 4 modulators also changes.</p>
DVB-T guard interval:	<p>A guard interval is transmitted between the symbols of the useful signal. This guard interval avoids the intersymbol interference during the DVB-T transmission.</p> <p>The delayed signals of other synchronized DVB-T senders or reflections have no effects on the decoding of the useful signal if they arrive during the guard interval. The period of the echoes must be shorter than the duration of the guard interval.</p> <p>Changing the guard interval adjusts the ratio between the transmission duration of the useful symbols and the duration of the guard interval.</p> <p>A great guard interval (e.g. 1/4) leads to a really small data rate.</p> <p>When transmitting on a perfect coaxial distribution network, a really small guard interval (1/32) is enough.</p>
DVB-T transmission modes (2 k and 8 k):	<p>Using the 8 k mode is recommended for reflections with really long durations. Due to the long symbol duration, long guard intervals are possible.</p>
Output level:	<p>The <i>Output Level</i> options include attenuation and deactivation of the modulator. The settings are separate for each of the four modulators. The max. output level of approx. 105 dB<math>\mu</math>V is reached with an <i>Output Level</i> setting of 20 dB.</p>
Vernier adjustment:	<p>The vernier adjustment of the output channel is performed in 1 MHz steps.</p>

### 3.6.2. Fill level

The data rate of the sender may vary depending on the image contents and on the transmission quality. To ensure an undisturbed reception, a reserve must absolutely be observed.



We recommend you to set the maximal fill level to 90%.

If the current fill level exceeds the maximal fill level, it may cause image disturbances, e.g. mosaic images.

If the net data rate of the signal exceeds the net data rate of the output channel, the modulator overflows. This overflow leads to disturbances. If the modulator overflows, the status LED on the front side of the device lights in red.

Filtering the programmes reduces the net data rate of the input signal. Subsequently, the net data rate of the output signal is also reduced.

The data rate of the DVB-T channel depends furthermore on the chosen channel bandwidth (7 or 8 MHz), on the set error correction rate (FEC) and the modulation rate (QPSK, QAM16, QAM64) of the modulator.

If the displayed data rate exceeds 90%, there are different possibilities to change it:

- ➔ Change to a channel with a bandwidth of 8 MHz if a 7 MHz channel was selected previously.
- ➔ Raise the modulation rate to 64 QAM. QPSK corresponds to the lowest, the QAM64 setting to the highest output data rate.
- ➔ Set the forward error correction to 7/8. With this setting, the data rate is increased, but the error correction is lower. A lower error correction requires a better transmission quality from the antenna network.
- ➔ Set the guard interval to 1/32. This shorter guard interval allows you to reach greater data rates.
- ➔ Reduce the number of selected programmes in the channel list.

COFDM modulated channels allow net data rates from 4.98 up to 31.67 Mbit/s (typically 24).

Modulation	Code rate	Guard interval			
		1/4	1/8	1/16	1/32
QPSK	1/2	4.976	5.529	5.855	6.032
	2/3	6.635	7.373	7.806	8.043
	3/4	7.465	8.294	8.782	9.048
	5/6	8.294	9.216	9.758	10.053
	7/8	8.709	9.676	10.246	10.556
16-QAM	1/2	9.953	11.059	11.709	12.064
	2/3	13.271	14.745	15.612	16.086
	3/4	14.929	16.588	17.564	18.096
	5/6	16.588	18.431	19.516	20.107
	7/8	17.418	19.353	20.491	21.112
64-QAM	1/2	14.929	16.588	17.564	18.096
	2/3	19.906	22.118	23.419	24.128
	3/4	22.394	24.882	26.346	27.144
	5/6	24.882	27.647	29.273	30.16
	7/8	26.126	29.029	30.737	31.668

### 3.6.3. Selected Programmes

The programme table SELECTED PROGRAMS shows the programmes that were activated in phase 2.

SELECTED PROGRAMS

Program Name	Type	Encryption
Das Erste HD	TV	FTA
SWR BW HD	TV	FTA

## 3.7. Maintenance

The menu entry MAINTENANCE enables software updates, changing the IP address, changing the password, restarting the headend and erasing service data.



### CURRENT SETTINGS

**Firmware version:** 1.02u (DVB-C)  
**Software version:** 1.34  
**Serial number:** 8687725  
**Temperature:** 39 C

Under Current Settings, you will find the following information:

- **Firmware version:** Displays the firmware version and the output modulation type.
- **Software version:** Displays the version of the interface
- **Serial number of the device**
- **Operating temperature of the FPGA** (must be -10 ° C ... + 50 ° C)

**Important:** If you stay on the maintenance page for more than 2.5 minutes, an automatic logout will occur and you will have to repeat the login procedure.

### 3.7.1. Updating firmware/software

New software for the graphical user interface can be installed under SOFTWARE FILE.

Software updates are available at | Downloads.

- **skq16\_vX.X.Xsrec**

➔ Download the file to your computer.



- ➔ Click under SOFTWARE FILE on „Browse...“.
- ➔ Browse for the file on your computer.
- ➔ Click on UPDATE.

The file will be uploaded to the device.



After this the update of the device begins, the remaining time ist shown as a countdown.

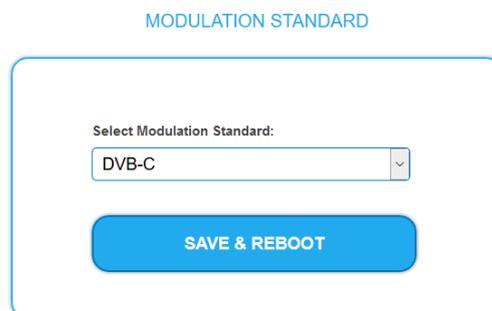


The headend will be automatically rebooted after an update. The enter password dialog will be displayed.

- ➔ After the Update, log in again.

### 3.7.2. Modulation standard.

Depending on the modulation standard the output signals are modulated into DVB-C or DVB-T.



- ➔ Select a **Modulation Standard**.
- ➔ Click SAVE & REBOOT.

The changing of the modulation standard begins, the remaining time ist shown as a countdown.



The headend will be automatically rebooted, the enter password dialog will be displayed.

- ➔ Enter the password again.
- ➔ Check especially the modulator settings and their fill level.

### 3.7.3. Changing the IP address

The network options are configured under the menu item MAINTENANCE> SYSTEM OPTIONS.

#### Dynamic IP address

- ➔ Use dynamic IP address to connect the device to a network with a DHCP server.

#### Static IP address

- ➔ Use a static IP address to connect the device to a network with a fixed IP address. The IP address, netmask and the gateway can be changed here. In addition, DNS server 1 and DNS server 2 can be entered.

A screenshot of the "SYSTEM OPTIONS" configuration screen. At the top, it says "SYSTEM OPTIONS". Below that, there are two radio buttons: "Use dynamic IP address" (unselected) and "Use static IP address" (selected). Underneath, there are several input fields for network configuration:

- IP Address (0-255): 192 . 168 . 178 . 140
- Netmask (0-255): 255 . 255 . 255 . 0
- Gateway (0-255): 192 . 168 . 178 . 1
- DNS Server 1 (0-255): 8 . 8 . 8 . 8
- DNS Server 2 (0-255): 8 . 8 . 8 . 8

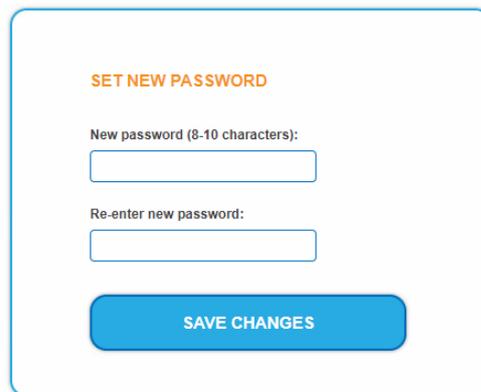
At the bottom, there is a blue button labeled "SAVE & REBOOT". The entire screen is enclosed in a light blue rounded rectangle.

- 
- Click SAVE & REBOOT to confirm and save the changes.  
When the changes are saved, the device will reboot automatically.
  - The **new IP address** has to be entered in the web browser and the enter password dialog will be displayed.

### 3.7.4. Changing the password

The default password is: *Ramsen8262*.

The default password should be changed right after commissioning the headend.



SET NEW PASSWORD

New password (8-10 characters):

Re-enter new password:

SAVE CHANGES

- Type an new password with 8-10 characters (letters and/or digits).
- Re-enter the password.
- Click SAVE CHANGES to confirm and save the changes.  
When the changes are saved, the frontpage will be shown.

### 3.7.5. Rebooting

Under REBOOT THE SYSTEM the device can be rebooted.



REBOOT

- Click on REBOOT.  
After rebooting, the password must be entered again.

**Note:** If SAT signals are temporarily unavailable (e.g. due to snow), the headend will reboot every 10 minutes. This ensures that all configured programmes will be available once the signal becomes available again.

### 3.7.6. Erasing service data

In the section ERASE SERVICE DATA you can erase the settings from phase 2. The transponder data must be read again for tuners 1-4 by executing a scan.

The headend is also set to remux mode.



ERASE SERVICE DATA

ERASE

- Click on erase.  
The frontpage will be shown.

---

### 3.7.7. Save Initialization Data

In the section SAVE SYSTEM INITIALIZATION DATA TO FILE you can save the current initialization data from phase 1 to 3 into a file on your computer.



→ Click on SAVE.

The data will be saved in a file called config.dat at the download folder on your computer.

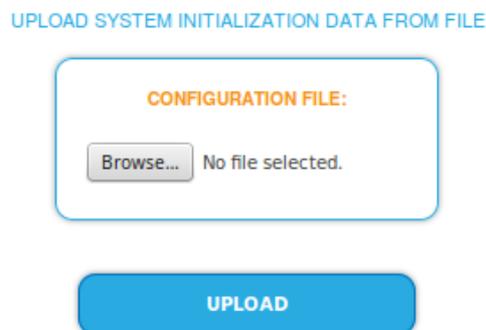
→ Click on PDF TO PRINT.

A PDF will be generated and saved in a file called config.pdf at the download folder on your computer.

**Note:** Password and IP address will not be saved.

### 3.7.8. Upload Initialization Data

In the section UPLOAD SYSTEM INITIALIZATION DATA FROM FILE you can upload the initialization data from a file to the modul.



→ Choose a configuration file.

→ Click on UPLOAD.

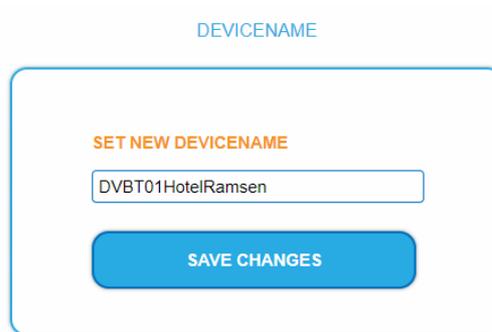
The upload will take a few seconds.

After the upload you have to log in again.

---

### 3.7.9. Device name

In the section DEVICE NAME you can set a new device name for the headend.



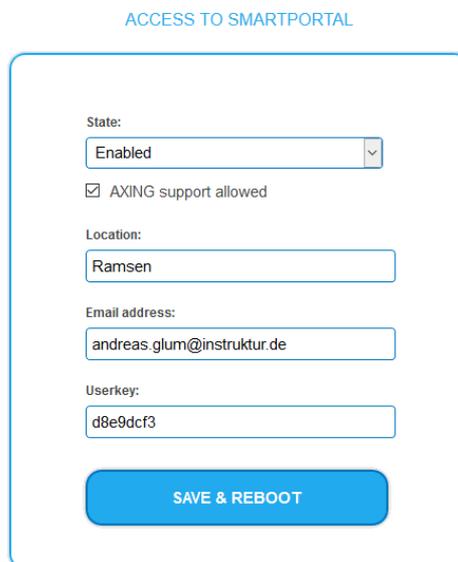
- ➔ Enter a name in the field SET NEW DEVICE NAME.
- ➔ Click on SAVE CHANGES.

The new device name is shown at the login.

### 3.7.10. Access to SMARTPortal

If you are a registered user of the SMARTPortal, then you can remotely control the headend via the SMARTPortal and, if necessary, receive support from AXING.

**Prerequisite is an internet connection for the headend.**



- ➔ In the **State** field, select **Enabled**.
- ➔ Activate, if required, the option **AXING support allowed**.
- ➔ In the field **Location**, enter a name for the location of the headend. This name will appear later in the SMARTPortal to help you identify the headend.
- ➔ In the field **Email address**, enter the e-mail address with which you are registered at SMARTPortal.
- ➔ In the field **User key**, enter the user key that you received when registering at SMARTPortal.
- ➔ Click on **SAVE & REBOOT**. The data is saved, the headend is rebooted and the connection to the SMARTPortal is established.

Where required, you have to adjust the connection data (see 3.7.3 on page 29).

### 3.7.11. Log files



In the section LOGS you can view the Log files .

➔ Choose Status Log.

The status log is written to RAM and starts again after a restart. In the status log for example, the lock in time and the frequencies of the tuners are stored.

➔ Select System log.

The system log is written to the flash memory, so it is still available after a restart. In the system log for example, the boot time and hardware defects are stored.

### 3.7.12. Channel list for all devices

You can create a common channel list for all devices with the same output modulation in the network.

#### CHANNEL LIST FOR ALL DEVICES:



➔ Select the headends that should be included in the channel list.

**Note:** You can only select headends with the same output modulation.

➔ Click on PRINT To PDF.

A PDF of the list is generated which you can open or save.

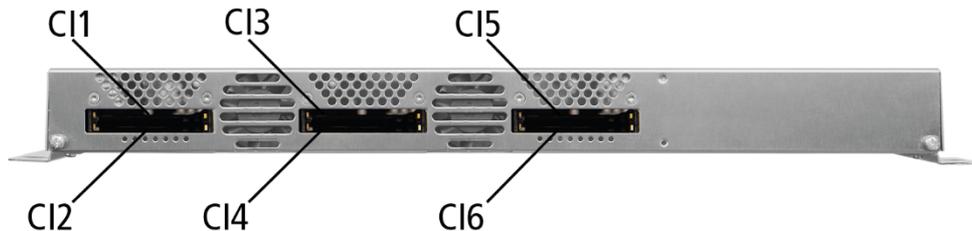
---

## 4. Use of CA modules

### 4.1. Insertion of CA modules

Up to six CA modules can be inserted into the CI-slots at the front side of the MK 8-06 or MK 16-06.

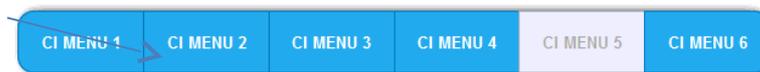
→ Carefully insert the CA modules to the corresponding CI slot without exerting force.



### 4.2. CI menu for MK 8-06 and MK 16-06

In the CI menus, settings of CA modules can be made. The buttons for opening the CI menu will be activated after the modules have been plugged in and initialised.

Active buttons for the CI menu.



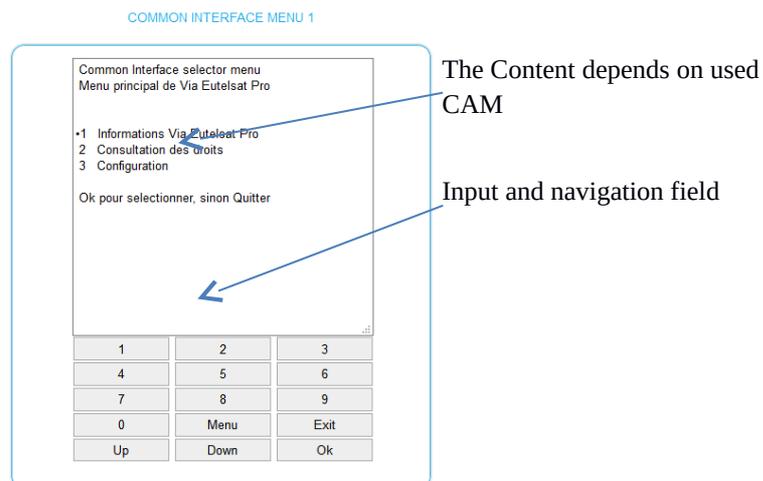
→ Click one of the buttons.

The corresponding CI menu is displayed.

#### 4.2.1. Using CI menu

The content of the CI menu depends on the CAM manufacturer and the card being used. Depending on the manufacturer, various settings are possible. Information on validity and authorisation are the most important.

→ Please observe the operating instructions provided by the manufacturer.



According to the used CAM different settings can be done. Most important is getting information about authorisation.

The input and navigation field is used for navigation within the CI menu.

- ➔ Use **Up** or **Down** to reach a higher or lower selection point.
- ➔ Use **Ok** to enter a corresponding sub menu or confirm a selection.
- ➔ Use **Menu** to come back to the next superordinate level.
- ➔ Use **Exit** to leave the menu.

### 4.3. Decryption of programmes

Scrambled programmes are indicated by the abbreviation CA in the column **Encryption** of the TUNER table. By default, in the column **Decrypt** the option **no** is chosen. The program will be transferred to the modulator in encrypted form and must be decrypted in the receiver.

If CA modules are plugged in, the corresponding programmes can be decrypted.

Choose a  
Common  
Interface

TUNER 1							
Modulator	LCN	Program Name	Type	Encryption	Decrypt	Service ID	Audio Lan
M1 M2 M3 M4 M5 M6 M7 M8		SRF 1 HD	TV	CA	CI 1		ALL
M1 M2 M3 M4 M5 M6 M7 M8		SRF zwei HD	TV	CA	no		ALL
M1 M2 M3 M4 M5 M6 M7 M8		RTS Un HD	TV	CA	no		ALL
M1 M2 M3 M4 M5 M6 M7 M8		RTS Deux HD	TV	CA	CI 2		ALL
M1 M2 M3 M4 M5 M6 M7 M8		Test17205	TV	CA	CI 3		ALL
					CI 4		
					CI 5		
					CI 6		

- ➔ Choose **CI 1...CI 6** in the column **Decrypt**.

The programm will be transferred to the choosen modulator in decrypted form.

## 5. Technical specifications

	<b>MK 800/MK 806</b>	<b>MK 1600/MK 1606</b>
Input tuner	8 × DVB-S/S2/S2x/T/T2/C	16 × DVB-S/S2/S2x/T/T2/C
Input frequency range DVB-C   DVB-T/T2   DVB-S/S2/S2X	50...898 MHz   900...2150 MHz	
Input level DVB-C   DVB-T/T2   DVB-S/S2/S2X	49...84 dBμV   39...84 dBμV   43...84 dBμV	
LNB voltage	13/17 V; 22 kHz on/off; DiSEqC 1.0	
LNB current per input (max.)	150 mA	
Symbol rate	1,5...45 MS/s	
Input error correction	automatic	
Input connector, female	8 × F	16 × F
Output TV channels	8 × DVB-C/DVB-T	16 × DVB-C/DVB-T
Output frequency range DVB-C   DVB-T	111...1006 MHz   111...862 MHz	
Output channels DVB-C   DVB-T	S2...K87   S2...K69	
Output level adjustable	80...100 dBμV	
Output modulation DVB-C   DVB-T	QAM 32, 64, 128, 256   QPSK, QAM 16, 64	
Output transmission symbol rate	1-7,5 M'Symbol sec	
MER DVB-C   DVB-T	≥ 40 dB   ≥ 36 dB	
FFT mode DVB-T	2k, 8k	
FEC DVB-T	1/2, 2/3, 3/4, 5/6, 7/8	
Output guard interval DVB-T	1/4, 1/8, 1/16, 1/32	
Output connector, female	1 × F	
Test port output	-30 dB	
Data interface	2 × RJ45	
Operation voltage	100...240 VAC/50...60 Hz	
Power consumption	50 W	60 W
Ambient temperature range (acc. to EN 60065)	-10°C...+50°C	
Dimensions (W × H × D) appr.	480 × 253 × 47 mm	